Intraosseous Lipoma of the Proximal Radius with Extraosseous Extension: A Case Report

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Examination of lipomatous tumors with ultrasound (US) is generally limited to the soft tissue component of the mass and cortical contours of the involved bone. We report a patient with an intraosseous lipoma of the proximal radius with extraosseous extension. US showed a heterogeneous hyperechoic mass lesion (3.5 × 3.0 cm in size) at the radial aspect of the left elbow, with bony cortex interruption. The lesion was associated with increased marginal color flow signals on color Doppler US study. Atypical lipoma or low-grade liposarcoma was diagnosed. The pathologic examination of the lesion demonstrated an abnormal collection of mature adipose tissue consistent with lipoma.

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KEY WORDS: • soft tissue tumor • lipoma • ultrasound • Doppler • bone

Introduction

Lipomatous tumors are common and account for approximately half of all soft tissue tumors in surgical series [1,2]. A lipoma is a benign mesenchymal tumor, the contents of which closely resemble normal fat. The resemblance is so great that the fat within a lipoma cannot be distinguished histologically from normal fat; however, there are biochemical and ultrastructural differences [1,2]. Ultrasound (US) has been used to examine both soft tissue and bone tumors, but magnetic resonance imaging (MRI) and computed tomography (CT) provide more information about the extent of tumor involvement. The diagnosis is best established by density measurements on CT. Although examination of lipomatous tumors with US is generally limited to the soft tissue component of the mass and cortical contours of the involved bone, it can clearly demonstrate the relationship of a mass to adjacent nerves, vessels, and bone. Bone marrow involvement cannot be evaluated by US. However, US may play a role in targeting CT or MRI examinations. It can be used to examine a lesion along its entire length in a few minutes, allowing targeted CT or MRI examination of the region of interest. This technique saves considerable time in CT and MRI studies, eliminating the need for a screening examination [3].

Case Report

An 81-year-old man with a 10-year history of a palpable painful mass lesion in the left elbow was referred for US examination. The patient had been

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in previous good health and was without major systemic disease. Physical examination at admission showed a left-elbow mass, which was soft in consistency and associated with mild local tenderness. There was no evidence of secondary posterior interosseous nerve palsy. Laboratory studies, including complete blood cell counts, blood and biochemistry urinalysis, were all within normal limits. Conventional radiographs of the left elbow in anteroposterior and lateral views showed the presence of a soft tissue mass with increased radiolucency. Bony erosion and a radiolucent expansile lesion involving the proximal end of the radius were also demonstrated (Fig. 1). Increased density and thickening of the bony cortex were noted around the proximal end of the radius. These were considered secondary to reactive bone formation or calcification inside the lesion. These findings were suggestive of intraosseous lipoma with extraosseous extension, and the differential diagnosis was intramuscular or parosteal lipoma with adjacent bone erosion.

US was performed to determine the relationship between the lesion and the surrounding structures. It demonstrated a heterogeneous hyperechoic mass lesion (3.5 × 3.0 cm in size) at the radial aspect of the left elbow with bony cortex interruption. There were some echogenic streaks in the mass, suggesting a lipomatous tumor. Color Doppler US showed increased marginal color flow signals (Fig. 2). The US diagnosis was lipomatous tumor, such as an atypical lipoma or low-grade liposarcoma. In addition, US demonstrated findings of irregular ossification at the radius of the left elbow joint, which correlated with the radiographic findings of reactive bone formation or calcification.

The patient later underwent surgical excision of the lesion. Pathologic examination demonstrated an abnormal collection of mature adipose tissue consistent with lipoma. Bony tissue with new bone formation was also noted. There was no evidence of malignancy. The patient had an uneventful recovery after surgery and has remained well for 2 years; there has been no evidence of local recurrence.

Discussion

Lipomas are rare tumors in bone. This is quite surprising, because lipocytes are widely distributed

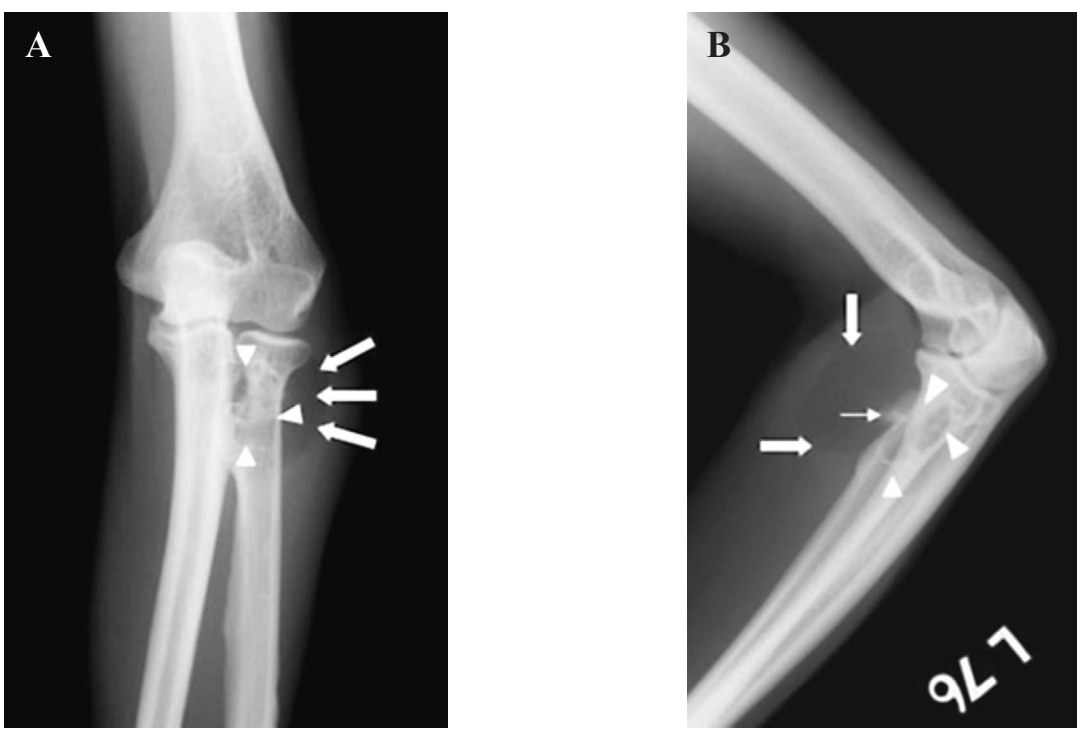

Fig. 1. *Plain roentgenography of the left elbow. (A) Anteroposterior view shows a radiolucent mass in the proximal forearm, superimposed on the proximal radius (large arrows). A radiolucent zone is also noted in the proximal radius, associated with sclerotic margins (arrowheads). (B) Lateral view shows similar findings. A bony protrusion continuous to the radial cortex is evident (small arrow), suggestive of bony reaction.*

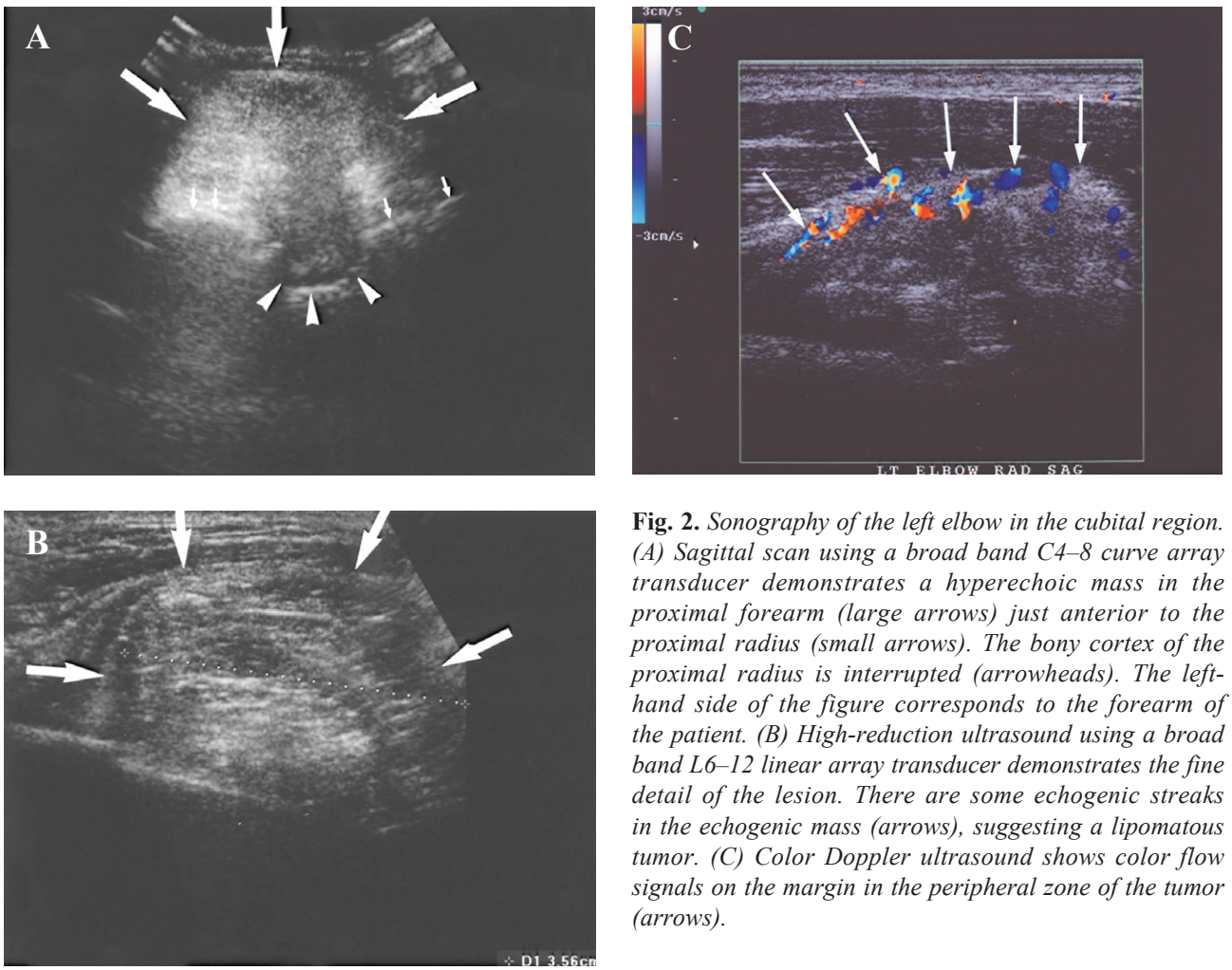

Fig. 2. *Sonography of the left elbow in the cubital region. (A) Sagittal scan using a broad band C4–8 curve array transducer demonstrates a hyperechoic mass in the proximal forearm (large arrows) just anterior to the proximal radius (small arrows). The bony cortex of the proximal radius is interrupted (arrowheads). The left-hand side of the figure corresponds to the forearm of the patient. (B) High-reduction ultrasound using a broad band L6–12 linear array transducer demonstrates the fine detail of the lesion. There are some echogenic streaks in the echogenic mass (arrows), suggesting a lipomatous tumor. (C) Color Doppler ultrasound shows color flow signals on the margin in the peripheral zone of the tumor (arrows).*

throughout normal bone marrow, and lipomas are common tumors of soft tissue [4]. Previous articles have described intraosseous lipomas [5–9], but there have been only a few case reports on intraosseous lipoma with extraosseous extension, and these rarely emphasize the US findings. CT and MR images of patients with fatty masses are usually sufficiently characteristic to suggest their lipomatous nature, and often allow a specific diagnosis. US, however, can determine the relationship with the surrounding structures, and demonstrate the mobility of the lesion using dynamic study. Completely mobile small lipomas can be enucleated by local excision [10,11]. Lipomas can have variable echogenicity. Lipomas of the subcutaneous tissues may appear hyperechoic (29%), hypoechoic (29%), isoechoic (22%), or can be of mixed echogenicity (20%) [3]. They are always soft, pliable masses, and typically have an elongated shape and an orientation parallel to the skin. Sixty-six percent of superficial lipomas have well-defined margins; the remainder are poorly defined [2]. Their echogenicity depends on the proportion of fat and water content in the lipoma [3]. Doppler US can also be applied to assess lesion vascularity. Lipomas are usually hypovascular or nearly avascular on color Doppler US [3].

The terms, atypical lipoma and atypical intramuscular lipoma, were first described by Evans et al [12]. They suggested that subcutaneous and intramuscular tumors with the histologic appearance of well-differentiated liposarcoma should be designated as atypical lipoma and atypical intramuscu-

lar lipoma, respectively, since they do not constitute a sufficient danger to life to be considered sarcomas [12]. In 1988, Evans grouped atypical lipoma and atypical intramuscular lipoma with well-differentiated liposarcoma under the designation of atypical lipomatous tumors. He concluded that differences in behavior were related to tumor location rather than histologic appearance [13,14].

The lesion in our patient involved two areas. It showed increased marginal color flow signals that were suggestive of atypical lipoma, but the pathologic findings were consistent with lipoma. The final diagnosis in our patient was intraosseous lipoma with extraosseous extension. An analysis of this case revealed that the tumor is a well-defined entity that may present with various features at different stages of evolution. Clinically, such lesions are often asymptomatic and are discovered incidentally, or they may produce slight mass effect in a superficially located bone. Radiographs may reveal that an apparent soft tissue mass is related to an underlying bone lesion. Finally, radiographs allow detection of underlying osseous involvement with periosteal reaction, cortical destruction, and marrow invasion. In conventional radiographs, when they consist of live fat cells, such lesions are quite radiolucent [4]. They may demonstrate resorption of pre-existing bone, and may be expansile. Sometimes, varying zones of fat necrosis are responsible for increased radiographic density due to fat calcification and reactive bone formation [4,15]. Both the axial and appendicular skeleton can be affected by lipoma [4]. Lipoma appears to be an indolent lesion causing few symptoms in the typical case. A remarkable feature of intraosseous lipoma is the absence of symptoms. In most reported cases, the patients were completely symptom-free and the lesions were found when radiographs were obtained for other reasons [4]. Treatment by surgical curettage appears to be an adequate therapy [15]. In our patient, there has been no obvious clinical recurrence since surgery. However, he should have long-term follow-up, as some literature suggests the possibility of malignancy as patient age increases.

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